

# PHILOSOPHICAL TRANSACTIONS.

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Monday, *Novemb.* 16. 1668.

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*An Account of some Observations, made this present year by Capt. Samuel Sturmy in Hong-road within four miles of Bristol, in Answer to some of the Queries concerning the Tydes, in N<sup>o</sup>. 17 & N<sup>o</sup>. 18.*

- I. ¶ Have observed, that our *Annual* Spring-Tydes do happen in *March* and *September*, either at the Tyde next before the Suns Ingress into the Equinoctial points of *Aries* and  
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Libra,

*Libra*, or the next Tyde after, according as the Moon is near her *Full* or *Change*, when the Sun thus enters into the said *Signes*: And then it flows in height about  $7\frac{1}{2}$  fathoms, or 45. foot; the lowest Neap-tydes flowing in height 25. foot.

2. We observe also, that the *lowest Neap* makes the *highest Spring*, if the *North-East Winds* hinder not by blowing hard, and so keep back the Tydes; as usually they do when they blow: whose contrary winds (*South-west*) if they blow hard, make here the highest Tydes.

3. Concerning our *Diurnal* Tydes, we observe, that from about the latter end of *March* till the latter end of *September*, they are about 1. foot and 3. inches higher perpendicularly in the Evening than in the Morning, that is, if high water happen after the Sun is past the *Meridian*, or in the Tydes betwixt Noon and Midnight. But from *Michael-mas* till our *Lady-day* we find the contrary, the Day-tydes being in that season higher by 15. inches than the Night tydes, or the Tydes between Midnight and Noon. And this proportion holds in both, after the gradual Increase of the Tydes rising from the Neap to the highest Spring, and the like Decrease of their Height till Neap again.

4. As for the highest *Menstrual* Spring-tyde, that is always the third after the Full Moon or Change-day, if it be not kept back by *North-East* winds, as it hath been, by my own Observations.

5. I have observed several times, that it flows here on the Change-day, when the Moon is *East-South-East*, the Tyde flowing in for the space of 5. hours, and ebbing 7. hours; so that there is an hour and an half difference from the *Old Tables*, which say, it flows but to the Moons being *East and West*: An Error so great, that by all means it ought to be rectified.

6. There is some difference in reckoning the Tydes by the Moons *Bearing* on such a point of the Compass on the Full or Change day. For then about that time only will the Rule hold to be exactly true. But from the Change to the Quarters, and from the Full to the Quarters again in the Neap-Tydes, I have observed, it does not flow here by two points of the Compass so long. But concerning the difference betwixt the New and full

Full Moon, and the Quarters, Mr. *Henry Philipps* hath framed a Table for the rectification of this Error in the River of *Thames*; to be found in Number 34. p. 656, 657. of the *Phil. Trans- actions*.

7. The water flows nor ebbs equal *spaces* in equal *times*, but its Velocity is strongest at the first both of the Flood and Ebb, and so gradually decreaseth until Full Sea or Low water. This is observ'd in Spring-Tydes only, as you may see by the following Table, which I have made from my Observations of our Tydes here. To make them always so near as to half inches, is neither easie, nor material, or usefull. But this hath been likewise observed, that it hath flowed or ebb'd at the first of the Tyde one foot in 6. minutes, or that then the Tyde ran out a foot in 6. minutes, or did rise so much in height.

*The Tyde-Table by Hour-quarters.*

Hours & quart. Feet Inch		Hours & quart. Feet. Inch.	
For the flowing of 5. hours.	1 — 2 — 7½	For the Ebbing of 7. hours.	1 — 2 — 7½
	2 — 2 — 6.		2 — 2 — 6.
	3 — 1 — 6.		3 — 2 — 6.
	1 ... — 2 — 6.		1 ... — 2 — 6.
	1 — 2 — 6.		— — — — —
	2 — 2 — 5½		— — — — —
	3 — 2 — 5.		— — — — —
	2 ... — 2 — 5.		2 ... — 9 — 0
	1 — 2 — 3.		— — — — —
	2 — 2 — 3.		— — — — —
	3 — 2 — 3.		— — — — —
	3 ... — 2 — 3.		3 ... — 8 — 0
	1 — 2 — 2.		— — — — —
	2 — 2 — 1.		4 ... — 6 — 9.
	3 — 2 — 1.		— — — — —
	4 ... — 2 — 1.		5 ... — 5 — 0
	1 — 1 — 9.		— — — — —
	2 — 1 — 8.		6 ... — 4 — 0
	3 — 1 — 8.		— — — — —
	5 ... — 1 — 8.		7 ... — 3 — 0

45. feet circiter.

45. feet circiter.

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[The Observer did not think it necessary to make every where in the Ebbing the like Division, he doth in the flowing hours, alledging for that omission the easiness of such a division, soon made by any body, because of the near agreement betwixt the divisions of both.]

8. The usual number of Tydes from New Moon to New Moon, or from the Full to the Full, is *Fifty nine*.

9. In the River of *Severn*, 20. miles above *Bristol* near *Newnham*, 160. miles from the Rivers mouth ( *Lundy*, ) the head of the Flood, at its coming in in Spring-tydes, ariseth in height like a Wall near *nine* foot high, and so runs for many miles together, covering at once all the Shoales, which were dry before; at which time all Vessels, that lye in the way of the said Head-tydes, or (as it is vulgarly called) *Boar*, are commonly overset or carried upon the Banks, and the head of the Tyde being past, such Vessels are left dry again. It flows there but *two* hours, and *eighteen* foot in height, and it ebb *ten* hours. The reason of the said *Boar* is doubtless the straightening and shoaling of the River in that place, it being there but half a mile broad; as it is but 20. peaches over, three miles higher; running tapering to *Glocester*.

*So far this Observer*; To whom as there are due particular acknowledgements for his care of observing hitherto, and for his frankness of communicating; so he is further desir'd to continue his Observations with as much exactness as may be, according to the directions set down in the above mentioned *Numb. 18.* especially to take particular notice, whether the Annual High-tydes, which he seems to fix on those (be it at New or Full) which happen nearest the Equinox, (be it before or after it) be not always before the Vernal Equinox in *March*, and upon the New Moon; and always after the Autumnal in *September*, and upon the Full-moon Spring-tydes: Forasmuch as by a former relation, imparted by a curious Gentleman, we have been informed, that the Annual highest Tydes about *Chepstow*-bridge, were at *St. Davids* and *Michaelmas*-Stream, that is, the one a little before the Vernal, and the other somewhat after the Autumnal Equinox, which agrees also with the Conjecture of a very intelligent Mathematician, who is withal of opinion, that because both are not far from the Equinoxes, ( though the one  
*before* )

before, the other after ) it might well give occasion to think it was depending on the *Æquinox*.

Moreover, the curious *Reader* may be pleased to compare this Account with that, which was given concerning the *Tydes* observed at *Plymouth*, *Numb.* 33. p. 633. and to take notice, that the difference of the *Day-tyde* from the *Night-tyde*, agrees in both, (of which the reason may be considered ; ) but, as to the difference of the increase and decrease of the *Water* about *Bristol* from what *Mr. Colepreſt* observed at *Plymouth*, that may much depend upon the position of the places; that of *Plymouth* being out to the *Sea*, this near *Bristol* being on the *Severn* far within *Land*.

Whilst the *Reader* is comparing this Information; with that of the lately cited *Nº.* 33. he will meet there *pag.* 633. in the last line, with the word *perpetual*, which he is desired to change into *proportional*, which indeed should have been intimated much sooner.

#### Ex Extract

*Of a Narrative, made by an Ingenious English Gentleman, now residing at Sevil, concerning his Voyage from Spain to Mexico, and of the Minerals of that kingdom.*

TO pass by many curious Observations touching the *Vegetable* and *Animal Sphere*, (which I reserve for another occasion) I shall now entertain you only with some of the Observables, I meet with about *Minerals* in the kingdom of *Mexico* whither I travell'd *A.* 1664. under the Character of a *Biscaner*, by the recommendation of a friend in the same Ship, that carried thither a New *Vice-roy* of *Mexico*, remaining in that Country almost two years in continual studies and researches, especially about *Minerals* and their Generation, Separation, &c.

And indeed Nature hath so prodigally enriched this Country with all sorts of *Minerals*, both perfect, imperfect and mixt that she almost overwhelms the Observation of the most diligent and most curious *Naturalists*. I have dealt with the skilfullest *Mine-men* in those parts, but I found them to know of, and care for little in the matter of *Minerals*, but *Gold* and *Silver*. Some of them

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